

REMARKS

Claims 55-57, 59, 69, 70, 72 and 80-83 are pending in the application. In the Office Action dated February 7, 2003, the Examiner took the following action: (1) restricted claims into three classes; (2) rejected claims 55-57, 69 and 70 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 10 of U.S. Patent No. 6,361,832 B1; (3) rejected claims 55-57, 59, 69, 70 and 72 under U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention; (4) rejected claims 55, 56 and 69 under U.S.C. § 102(b) as being anticipated by Drawl (US 4,992,082); (5) rejected claims 57, 59, 70 and 72 under U.S.C. § 103(a) as being unpatentable over Drawl et al. (US 4,992,082), as applied to claims 56 and 69 respectively, and in further view of James et al. (US 6,069,080). Applicants respectfully request reconsideration of the application in view of the foregoing amendments and the following remarks.

In a telephone conversation with the undersigned on February 3, 2003, the Examiner imposed a Restriction Requirement in the present application. During this conversation, the undersigned elected the claims corresponding to Group I, claims 55-57, 59, 69, 70 and 72. Applicants hereby affirm this election without traverse.

Some of the technical differences between the applied references and various embodiments of the invention will now be discussed. Of course, these discussed differences, which are disclosed in detail in the patent specification, do not define the scope or interpretation of any of the claims. Where presented below, such discussed differences merely help the Examiner appreciate important claim distinctions discussed thereafter.

The various embodiments of the present invention are directed to polishing pads, apparatuses and methods for making polishing pads used in the manufacture of microelectronic devices. In an embodiment of the invention, a polishing pad has a backing member including a first surface and an opposing second surface. A plurality of pattern elements are distributed on the first surface of the backing member, and a hard cover layer is then applied over the pattern

elements. The pattern elements thus define a plurality of contour surfaces that project away from the first surface of the backing member.

The cover layer at least substantially conforms to the contour surfaces of the pattern elements to form a plurality of hard nodules on the backing surface. The hard nodules define abrasive elements to contact and abrade material from a microelectronic device substrate assembly. Accordingly, the cover layer defines at least a portion of a planarizing surface of the polishing pad.

In a pertinent embodiment of the invention, a polishing pad is manufactured by depositing a plurality of pattern elements over the first surface of the backing member, and then depositing the hard cover layer over the pattern elements. The pattern elements may be deposited onto the first surface of the backing member by drawing or pulling the backing member through a bath having a liquid having a plurality of the pattern elements suspended in the liquid. Such pattern elements may be colloidal in the liquid. After the backing member is removed from the bath, the liquid portion evaporates, leaving a plurality of pattern elements distributed on the first surface of the backing member. The hard cover layer may then be deposited over the pattern elements using a chemical vapor deposition process, plasma vapor deposition, or other similar processes suitable for forming thin films on a surface.

As disclosed in detail at page 9, lines 29-30, bridging to page 10, lines 1-11, the backing member can be a continuous web that may be wrapped around a roller of a web format planarization machine, or the backing member may be cut into a circular shape for attachment to a platen of a rotary planarization machine. In either case, the backing material may be comprised of a compressible polymeric material. Suitable compressible polymeric materials include polyurethanes. Alternatively, the backing member may be comprised of a cured resin, so that the backing member is relatively incompressible.

The Examiner has cited the Drawl reference as pertinent to the patentability of claims in the present application. Drawl discloses a method for forming a diamond or diamond-like coated tool by depositing a plurality of layers of separated diamond, or a diamond-like material onto a supporting substrate composed of a rigid material. Specifically, the Drawl reference discloses at col. 8, lines 23-27, that the substrate material "...is chosen

from...materials having strength-related physical properties *not degraded by exposure of the substrate to coating temperatures necessary for the diamond deposition and associated processing steps.*" (Emphasis added). The necessary temperature is disclosed at col. 10, lines 44-46, which states in pertinent part, that "Nucleation of separated diamond or diamond-like particles is assured by (i) maintaining the substrate temperature *in the range of 600°-950° C...*". (Emphasis added). Accordingly, the disclosed substrate materials "...include silicon and its carbides or nitrides, families of cobalt cemented tungsten carbide, nickel molybdenum alloy cemented titanium carbide, and other similar families formed by powder metallurgical processing..." (col. 8, lines 31-35).

The Drawl reference therefore fails to disclose or fairly suggest the use of a polymeric material as the substrate supporting the diamond or diamond-like particles. Further, the disclosed method is incompatible with the use of a polymeric material in view of the elevated temperature levels required.

The Examiner has further cited the James reference as pertinent to the patentability of claims in the present application. James discloses a method of manufacturing a fixed abrasive polishing pad where solid abrasive particles are dispersed in an aqueous solution and then applied to a surface of the substrate by spraying the aqueous solution onto the surface, and allowing the solution to evaporate.

Although the James reference discloses a polymeric material as a phase material, the asserted combination fails due to the high temperatures disclosed in Drawl. The references are therefore not properly combinable or modifiable since their intended function would be destroyed.

Turning now to the claims, patentable differences between the applied references and the claim language will be pointed out. Claim 55, as amended, recites in pertinent part, "A method of manufacturing a polishing pad for planarization of a microelectronic-device substrate assembly, comprising...forming a plurality of contour surfaces over a first surface of *a polymeric backing member* to project away from the first surface..." (Emphasis added). Drawl does not disclose this. Instead, Drawl relies on a variety of rigid substrates capable of resisting high temperatures. Accordingly, claim 55 is allowable over the Drawl reference. Claims depending

from claim 55 are also allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 69 recites in pertinent part "A method of manufacturing a polishing pad for planarization of a microelectronic-device substrate assembly, comprising...distributing a plurality of pattern elements over a first surface of a *polymeric backing member*, the pattern elements defining a plurality of contour surfaces projecting away from the first surface of the backing member.." (Emphasis added). Again Drawl does not disclose this, as described in greater detail above. Claim 69 is now allowable over the Drawl reference. Claims depending from claim 69 are also allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

The Examiner has rejected claims 55-57, 59, 69, 70 and 72 based upon the recitation of the term "hard" in connection with the cover layer. The Examiner asserts that the use of this term renders the claims indefinite. It is well settled, however, that the claims are read in light of the specification, so that one skilled in the art may be reasonably apprised of the scope of the invention. In the present case, one skilled in the art would understand that the cover layer would be required to have a hardness that at least exceeds the hardness of the materials that comprise the substrate assembly. Since this could entail a large number of cover layer materials, the terminology is as precise as the subject matter allows. Further, the specification does provide exemplary cover layer materials of determinable hardness, such as silicon nitride, ceria, silica, alumina, zirconia, titanium, or titanium nitride. Accordingly, applicants respectfully assert that the claim language is sufficiently definite.

With regard to Examiner's claim rejections under 35 U.S.C. § 103(a), applicants respectfully assert that the foregoing claim amendments fully address these rejections.

With regard to the Examiner's objection to the Abstract, applicants have attached a substitute Abstract addressing the issues identified by the Examiner.

Formal drawings are being submitted to overcome the objection of the Draftsperson.

A terminal disclaimer is also submitted to overcome Examiner's non-statutory double patenting rejection.

In light of the foregoing amendments and remarks, Applicants believe that all claims are now in condition for allowance, and that action is respectfully requested. If there are any remaining matters that can be handled in a telephone conference, the Examiner is invited to telephone the undersigned attorney, Steven H. Arterberry, at (206) 903-8787.

Respectfully submitted,
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SHA:pep
Enclosures:

- Check
- Postcard
- Fee Transmittal Sheet (+ copy)
- Substitute Abstract
- Transmittal of Formal Drawings
- Formal Drawings (4 sheets, Figures 1-8)
- Terminal Disclaimer

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